

**What is claimed is:**

**1) An apparatus for the fabrication of structural members of metal matrix composites comprising:**

**A) a surface;**

**5 B) a carriage mechanism;**

**C) a compaction device attached to said carriage mechanism so as to permit controlled relative movement between said compaction device and said surface;**

**10 D) a metal matrix composite prepreg tape feeding mechanism that supplies metal matrix tape that addresses said surface to a junction between said surface and said compaction device as it enters said junction; and**

**15 E) a laser generating an laser beam that impacts said metal matrix tape in said junction causing at least a surface of said prepreg tape it to fuse as said metal matrix tape passes under said compaction device.**

**20 2) The apparatus of claim 16 wherein said prepreg tape comprises a matrix of aluminum or an aluminum alloy encompassing fibers selected from the group consisting of carbon, boron, ceramic and glass fibers.**

- 3)     **The apparatus of claim 17 said laser comprises a stacked multi-bar infrared laser.**
- 5       4)     **The apparatus of claim 17 wherein said stacked multi-bar infrared laser includes optical lenses that shape the infrared beam into a pattern that matches the cross sectional dimensions of said prepreg tape.**
- 10      5)     **The apparatus of claim 16 wherein said surface and said compaction device both comprise the same or different ceramic materials.**
- 6)     **The apparatus of claim 16 further including preheaters that heat said prepreg tape prior to entering said junction.**
- 15      7)     **The apparatus of claim 20 wherein said preheaters comprise infrared reflector lamps.**
- 8)     **The apparatus of claim 16 further including an optical pyrometer that**  
20       **addresses said junction and views said metal matrix prepreg tape in said junction and provides temperature feedback information for controlling the power of said laser or the relative movement of said surface and said compaction device.**

**23) The apparatus of claim 16 further including a mechanism for inducing vibratory energy to said prepreg tape prior to entry into said junction at a frequency of between about 1000 and 25000 vibrations per minute.**

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